

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2012 Fisheries Management Survey Report

Diversion Reservoir

Prepared by:

Tom Lang, District Management Supervisor
and
Robert Mauk, Assistant District Management Supervisor

Inland Fisheries Division
District 2-E, Wichita Falls, Texas



Carter Smith
Executive Director

Gary Saul
Director, Inland Fisheries

July 31, 2013

TABLE OF CONTENTS

Survey and Management Summary.....	2
Introduction.....	3
Reservoir Description	3
Angler Access	3
Management History	3
Methods.....	5
Results and Discussion.....	5
Fisheries Management Plan.....	6
Literature Cited.....	7
Figures and Tables.....	8-15
Water Level (Figure 1)	8
Reservoir Characteristics (Table 1).....	8
Boat Ramp Characteristics (Table 2)	8
Harvest Regulations (Table 3)	9
Stocking History (Table 4).....	10
Structural Habitat Survey (Table 5).....	11
Aquatic vegetation Survey (Table 6)	11
Blue Catfish (Figure 2)	12
Channel Catfish (Figure 3).....	13
White Bass (Figure 4)	14
Proposed Sampling Schedule (Table 7)	15
Photograph of Diversion boat ramp (Figure 5)	15
Appendix A	
Catch Rates for all Species from all Gear Types	16
Appendix B	
Map of 2013 Sampling Locations	17

SURVEY AND MANAGEMENT SUMMARY

Fish populations in Diversion Reservoir were surveyed in 2013 using gill nets. Historical data are presented for comparison purposes. This report summarizes the results of the survey and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Diversion Reservoir is a 3,491-acre impoundment located in Archer and Baylor counties on the Wichita River, a tributary of the Red River, approximately 30 miles west of Wichita Falls. It was impounded in 1924 and is jointly owned by the City of Wichita Falls and Wichita County Water Improvement District No. 2 and is operated primarily for irrigation. In February 2009, Diversion and Kemp Reservoir above it, began service as a secondary municipal water source for the city of Wichita Falls. The Waggoner Ranch based in Vernon, Texas privately owns the land surrounding the reservoir. Vehicle and boat trailer access is through a single tollgate on the northeast side. On January 1, 2009, a \$15 per person fee for a three-day pass was instituted. Also on January 1, 2009 annual permit fees were raised from \$200 to \$500. The reservoir elevation is consistent, varying not more than three feet a year except for 2012-2013 when the reservoir reached 5 feet below normal pool caused by the severe drought and elevation conditions at Kemp reservoir, which feeds Diversion. At this elevation, the lone boat ramp is unusable. Diversion is relatively shallow, with moderately clear water. Protective cover in littoral areas includes standing timber and submersed vegetation as observed during the 2012 habitat survey. During the winter/spring months of 2001-2013 the fishery was adversely affected by toxic golden alga blooms resulting in significant losses of game fish and a reduction in angling opportunity.
- **Management History:** Historically important sport fish included Channel Catfish, White Bass, Largemouth Bass and White Crappie. Fingerling Florida Largemouth Bass and Channel Catfish were stocked in 2005 in response to golden alga fish kills.
- **Fish Community:**

The 2012 electrofishing and trap net surveys could not be conducted because low reservoir elevation made launching a boat impossible. A 2013 gill net survey was completed as scheduled.

- **Catfishes:** Blue Catfish were not sampled in the 2013 gill net survey. Their population has shown a steady decline in abundance since toxic golden alga first affected the reservoir. Channel Catfish abundance was good being one of the highest catch rates observed for the reservoir. A length range of 18-26 inches was sampled in 2013.
- **White bass:** No White Bass were sampled during the 2013 gill netting survey, just as in the 2009 survey. It is uncertain what the population status is at present.
- **Management Strategies:** Continue monitoring the reservoir for golden alga. Survey the reservoir every four years.

INTRODUCTION

This document is a summary of fisheries data collected from Diversion Reservoir in 2013. The document's purpose is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fish was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented for comparison purposes.

Reservoir Description

Diversion is a 3,491-acre reservoir located in Archer and Baylor counties, and was impounded in 1924. Diversion is an impoundment of the Wichita River approximately 20 miles below Kemp Reservoir. Controlled releases from Kemp maintain nearly constant water levels at Diversion. This results in reservoir fluctuations of not more than three feet a year except for 2012-2013 when the reservoir reached 5 feet below normal pool caused by the severe drought and elevation conditions at Kemp reservoir (Figure 1). At this elevation, the lone boat ramp is unusable. The reservoir has a 234 square-mile drainage area which flows through rolling plains and grasslands. Erosion of Permian outcroppings and salt springs in the watershed results in high concentrations of dissolved salts in the reservoir. Diversion is relatively shallow, with moderately clear water and a basic pH. It has a shoreline length of 28 miles, mean depth of 12 feet, and a maximum depth of 35 feet. The reservoir is jointly owned by the City of Wichita Falls and Wichita County Water Improvement District No. 2 and has been operated primarily for irrigation purposes. In February 2009 Diversion along with Kemp Reservoir began serving as secondary municipal water sources for the city of Wichita Falls. The Waggoner Ranch based in Vernon, Texas privately owns the land surrounding the reservoir charging a fee to access their property. On January 1, 2009, a \$15 per person fee for three-day passes was instituted. Also on January 1, 2009 annual permit fees were raised from \$200 to \$500. During the 2012 habitat survey, standing timber and over 600 acres of submersed vegetation were observed.

Diversion serves as the water supply for the Dundee State Fish Hatchery. On March 16, 2001 a heavy bloom of the toxic golden alga *Prymnesium parvum* was first confirmed in the reservoir. Fish hatchery operations were impacted and significant mortalities occurred. During the winter and spring months of 2003-2013 the Diversion fishery has been impacted by toxic golden alga blooms, which combined with the increased gate fees, has led to sharp reductions in angling activity.

Angler Access: Diversion Reservoir has one public boat ramp and no private boat ramps. For much of the 2012-13 survey year, boat access was unavailable because the ramp was above the waterline. Extension of the ramp is not feasible. Additional boat ramp characteristics are in Table 2. Shoreline access is limited to the public boat ramp area and the reservoir spillway area.

Management History

Previous management issues and actions: Management issues and actions from the previous survey report (Mauk and Howell 2009):

1. Golden alga fish kills have occurred nearly every year at Diversion since 2001. The fish populations have been adversely affected and angler use has declined. Using the Dundee State Fish Hatchery located behind the Diversion dam, monthly monitor golden alga cells by hatchery personnel.

Action: Monitored reservoir for golden alga blooms utilizing Dundee State Fish Hatchery incoming water cell counts as an early indicator of problems.

2. Reservoir access is controlled by a single toll gate operated by the Waggoner Ranch. The fees charged decrease public usage of the reservoir. The fees must be monitored for changes and if an opportunity presents itself to discuss the issue with the Waggoner Ranch

personnel, it should be done.

Action: Monitored reservoir entry fees charged by the Waggoner Ranch for changes. Made public aware of a small area of public access available near the spillway. The Waggoner Ranch is in a court ordered process of being sold, so no discussions have occurred.

Harvest regulation history: Sport fish species were managed with statewide regulations (Table 3).

Stocking history: In response to Largemouth Bass and Channel Catfish population decreases caused by golden alga fish kills, both species were supplementally stocked in 2005. The complete stocking history is shown in Table 4.

Water transfer: Diversion is primarily used as an irrigation water supply reservoir. In 2009, the city of Wichita Falls began treating Kemp reservoir water for municipal usage. Kemp is immediately upstream of Diversion and its water releases help keep Diversion a constant level reservoir. Three water transfers take place from the reservoir. The first is the irrigation canals that exit the reservoir and transport water to surrounding ranches. The second is the water that goes to the Dundee State Fish Hatchery just below the dam. The final transport of water is to the AEP Texas North coal burning Oklaunion Power Plant for water cooling.

METHODS

Fishes were collected by gill netting (7 net nights at 7 stations). Catch per unit effort (CPUE) for gill nets was recorded as the number of fish caught per net night (fish/nn). All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. (2007)], and condition indices [relative weights (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics.

Source of water level data was the United States Geological Survey (USGS) website.

RESULTS AND DISCUSSION

Habitat: A physical habitat survey was conducted August 15, 2012 and indicated that the littoral zone habitat consisted primarily of rocky and featureless shoreline. Open water habitat consists of submerged aquatic vegetation and flooded dead trees (Table 5). The acreage of submerged aquatic vegetation has nearly doubled since the previous physical habitat survey conducted in 2008 (Mauk and Howell 2009). There were few if any observed manmade changes to the physical habitat during the four year period.

The 2012 electrofishing and trap net surveys could not be conducted because low reservoir elevation made launching a boat impossible. A 2013 gill net survey was completed as schedule.

Blue Catfish: Blue Catfish were not sampled in the 2013 gill net survey (Fig. 2). The population has shown a steady decline in abundance since toxic golden alga first affected the reservoir. It is unknown whether the species still exists in the reservoir.

Channel Catfish: Channel Catfish abundance increased to pre golden alga fish kill levels (Fig. 3). Catch per unit effort was 1.3/nn compared to the last two surveys when it was 0.7/nn. All sampled catfish were adults ranging in length from 18-26 inches. Body condition was good with W_r 's ranging from 92-106. Channel Catfish populations do not appear to be negatively impacted by golden alga to the same extent that Blue Catfish populations are. This is a trend we observe for many of our reservoirs impacted by golden alga.

White bass: No White Bass were sampled during the 2013 gill netting survey (Fig. 4), just as in the 2009 survey. It is uncertain what the population status actually is at present.

Fisheries management plan for Diversion Reservoir, Texas

Prepared – July 2013

ISSUE 1: Golden alga fish kills have been documented nearly every year at Diversion since 2001. Fish populations have been adversely affected.

MANAGEMENT STRATEGIES

1. Continue to help document toxic golden algal bloom events.
2. Confine fish monitoring efforts to once every four years.

ISSUE 2: Reservoir and boat ramp access is limited to a single toll gate controlled by the Waggoner ranch. Perceived high entry fees charged by Waggoner Ranch has resulted in a sharp decline in angler use.

MANAGEMENT STRATEGIES

1. Continue to monitor the entry fees the ranch charges to better inform the public.
2. Make public aware that there is a small area of public land near the spillway with access to the reservoir that can be used for shoreline angling.
3. Talk to new owners after sale of ranch is complete about access issues.

ISSUE 3: Boating access at the public boat ramp was impeded by low water level in 2012-13. The boat ramp cannot be extended because the lake bottom levels out at the end of the ramp with no access to deeper water.

MANAGEMENT STRATEGY

1. Diversion is operated as a constant elevation reservoir. The ramp is usually operational except under extreme conditions such as the current drought conditions. Monitor the reservoir elevation to keep the public informed of the availability of the ramp.

ISSUE 4: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters and literature, etc. so that they can in turn educate their customers.
3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

SAMPLING SCHEDULE JUSTIFICATION:

Standard sampling will be conducted in 2016-2017 to continue monitoring species population trends.

LITERATURE CITED

Anderson, R. O. and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Guy, C. S., R. M. Neuman, D. W. Willis, and R. O. Anderson. 2007. Proportional size distribution (PSD) a further refinement of population size structure index terminology. Fisheries 32(7): 348.

Mauk, R., and M. Howell. 2009. Statewide freshwater fisheries monitoring and management program survey report for Diversion Reservoir, 2008-09. Texas Parks and Wildlife Department, Federal Aid Report F-30-R-34, Austin, Texas.

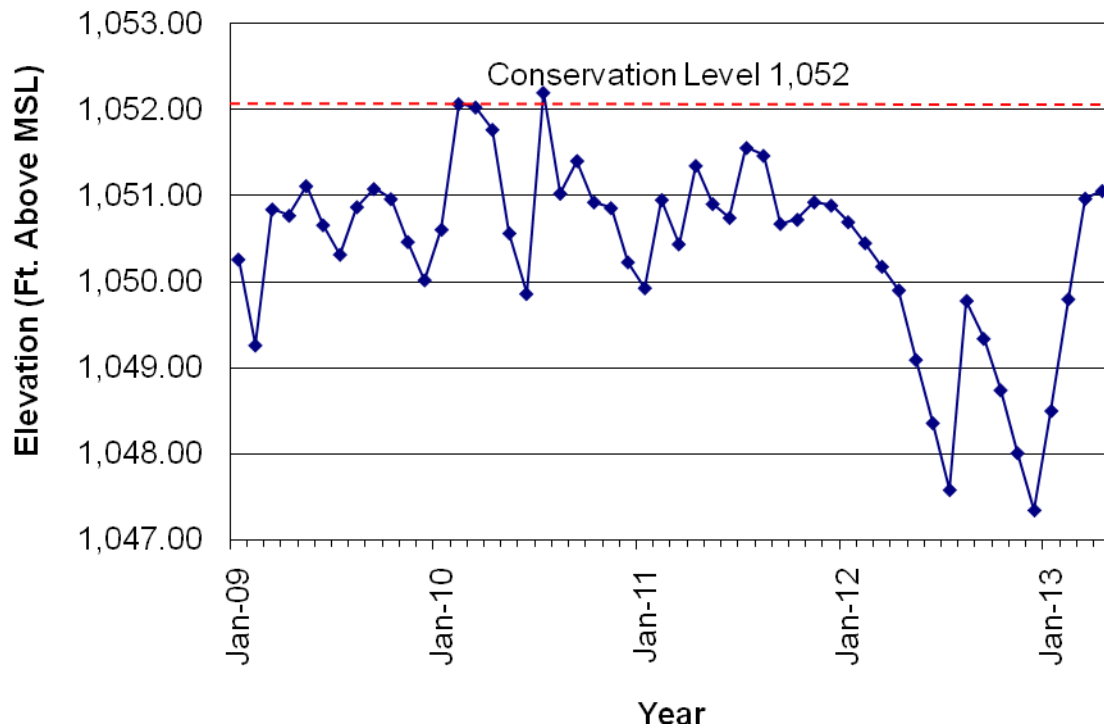


Figure 1. Monthly water level elevation averages in feet above mean sea level (MSL) recorded for Diversion Reservoir, Texas.

Table 1. Characteristics of Diversion Reservoir, Texas.

Characteristic	Description
Year constructed	1924
Controlling authority	City of Wichita Falls-Wichita Co. WID #2
Counties	Archer and Baylor
Reservoir type	Tributary
Shoreline development index (SDI)	4.5
Conductivity	8,330 $\mu\text{S}/\text{cm}$

Table 2. Boat ramp characteristics for Diversion Reservoir, Texas, August, 2012. Reservoir elevation at time of survey was 1050 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Diversion	33.82260 -98.94955	Y	18	1049	Must check on reservoir elevation at time of boating

Table 3. Harvest regulations for Diversion Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Flathead Catfish	5	18-inch minimum
White Bass	25	10-inch minimum
Largemouth Bass	5	14-inch minimum
White Crappie	25	10-inch minimum

Table 4. Stocking history of Diversion (Baylor County), Texas. Life stages are fry (FRY), fingerlings (FGL), advanced fingerlings (AFGL), adults (ADL) and unknown (UNK). Life stages for each species are defined as having a mean length that falls within the given length range. For each year and life stage the species mean total length (Mean TL; in) is given. For years where there were multiple stocking events for a particular species and life stage the mean TL is an average for all stocking events combined.

Species	Year	Number	Life Stage	Mean TL (in)
Blue Catfish	1989	34,315	FGL	2.5
	1990	34,620	FGL	2.0
	1991	33,099	FGL	2.1
	Total	102,034		
Channel Catfish	1969	10,000	AFGL	7.9
	1970	14,000	AFGL	7.9
	1981	53,527	AFGL	7.9
	2005	71,946	FGL	2.9
	Total	149,473		
Florida Largemouth Bass	1993	177,710	FGL	1.7
	2005	177,151	FGL	1.5
	Total	354,861		
Palmetto Bass (Striped X White Bass hybrid)	1979	350,000	FRY	0.4
	1981	400,000	FRY	0.4
	Total	750,000		
Walleye	1969	4,700,030	FRY	0.2
	1970	400,000	FRY	0.2
	1971	1,450,000	FRY	0.2
	1972	435,675	FRY	0.2
	1973	1,230,475	FRY	0.2
	1974	70,000	FRY	0.2
	1989	445,000	FRY	0.2
	1993	3,367,368	FRY	0.2
	1994	6,847,103	FRY	0.2
	1998	75,300	FGL	1.7
	1999	38,945	FGL	1.4
	2000	171,711	FGL	1.6
	Total	19,231,607		

Table 5. Survey of structural habitat types, Diversion Reservoir, Texas, 2012. Shoreline habitat type units are in miles and standing timber is in acres.

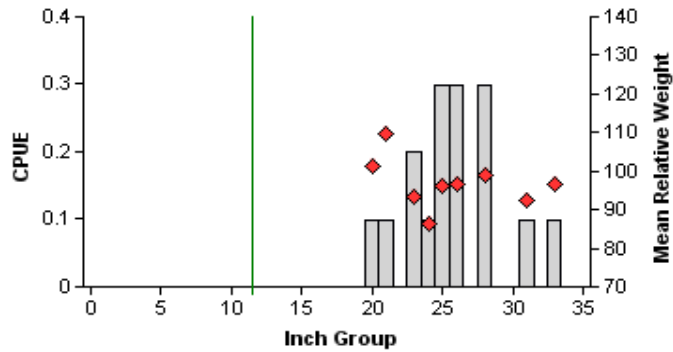
Habitat type	Estimate	% of total
Bulkhead	0.1 miles	0.4
Rocky with boat docks	1.4 miles	5.0
Natural with boat ramps	1.8 miles	6.4
Natural	11.5 miles	41.0
Rocky	13.2 miles	47.1
Standing timber	209.4 acres	6.0

Table 6. Survey of aquatic vegetation, Diversion Reservoir, Texas, 2008 and 2012. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2008	2012
Native submersed	319 (9.1)	634.5 (18.2)
Native emergent	3.0 (<0.1)	

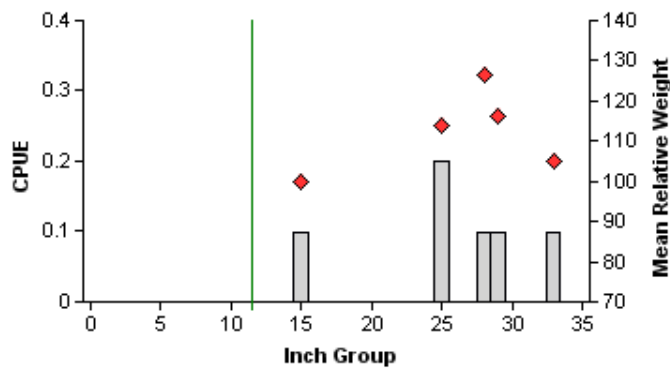
Blue Catfish

2005



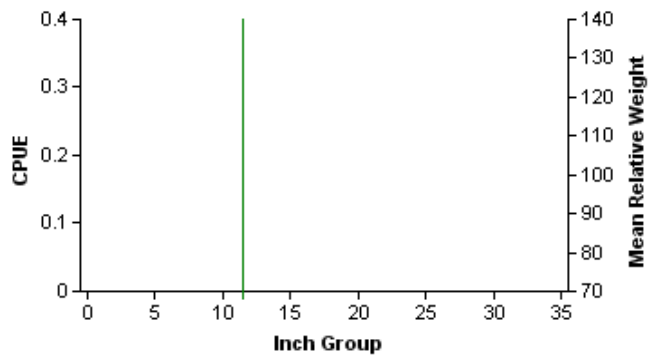
Effort = 10.0
 Total CPUE = 1.6 (41; 16)
 Stock CPUE = 1.6 (41; 16)
 PSD = 100 (0)
 PSD-P = 12 (8.6)

2009



Effort = 10.0
 Total CPUE = 0.6 (51; 6)
 Stock CPUE = 0.6 (51; 6)
 PSD = 83 (17.6)
 PSD-P = 17 (10)

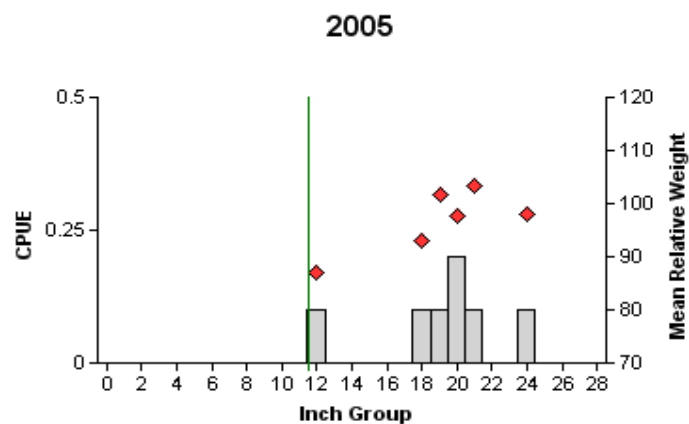
2013



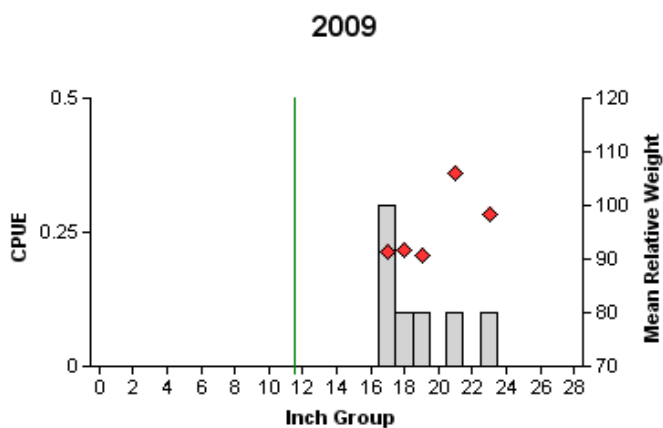
Effort = 7.0
 Total CPUE = 0.0 (0; 0)
 Stock CPUE = 0.0 (0; 0)
 PSD = 0 (-1)
 PSD-P = 0 (10)

Figure 2. Number of Blue Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Diversion Reservoir, Texas, 2005, 2009, and 2013. Line indicates minimum length limit at time of sampling.

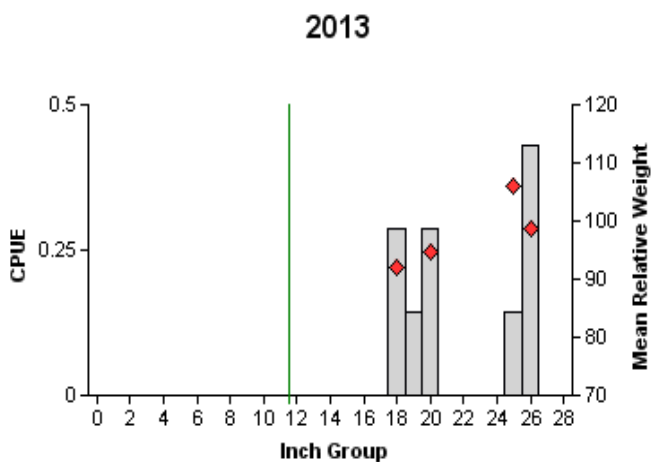
Channel Catfish



Effort = 10.0
 Total CPUE = 0.7 (48; 7)
 Stock CPUE = 0.7 (48; 7)
 PSD = 86 (10.2)
 PSD-P = 14 (10.2)



Effort = 10.0
 Total CPUE = 0.7 (30; 7)
 Stock CPUE = 0.7 (30; 7)
 PSD = 100 (0)
 PSD-P = 0 (0)



Effort = 7.0
 Total CPUE = 1.3 (51; 9)
 Stock CPUE = 1.3 (51; 9)
 PSD = 100 (0)
 PSD-P = 44 (16.9)

Figure 3. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Diversion Reservoir, Texas, 2005, 2009, and 2013. Line indicates minimum size limit at time of sampling.

White Bass

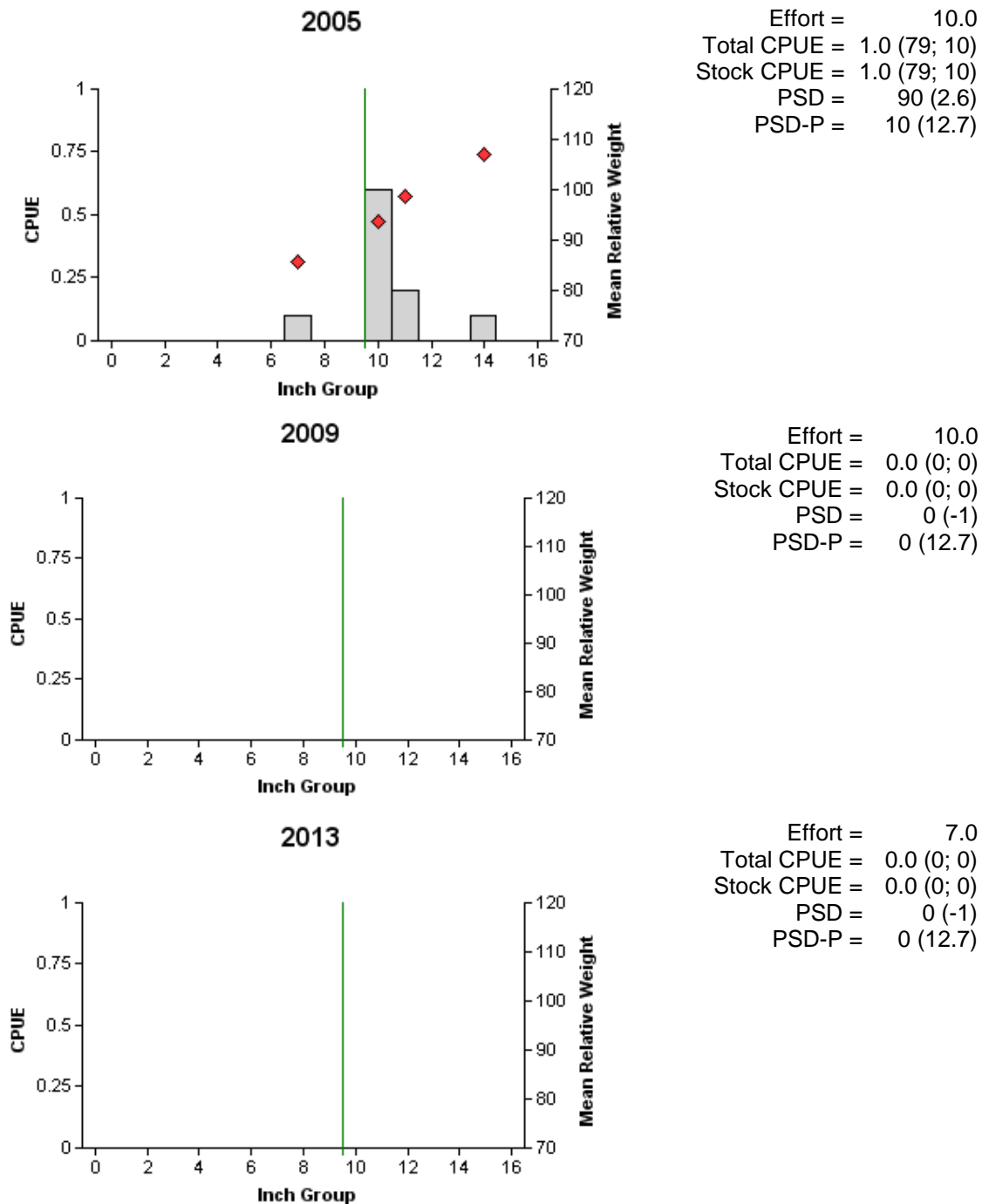


Figure 4. Number of White Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill netting surveys, Diversion Reservoir, Texas, 2005, 2009, and 2013. Line indicates minimum size limit at time of sampling.

Table 7. Proposed sampling schedule for Diversion Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

Survey year	Electrofishing Fall(Spring)	Trap net	Gill net	Habitat		Access	Creel survey	Report
				Structural	Vegetation			
2013-2014								
2014-2015								
2015-2016								
2016-2017	S	S	S		S	S		S

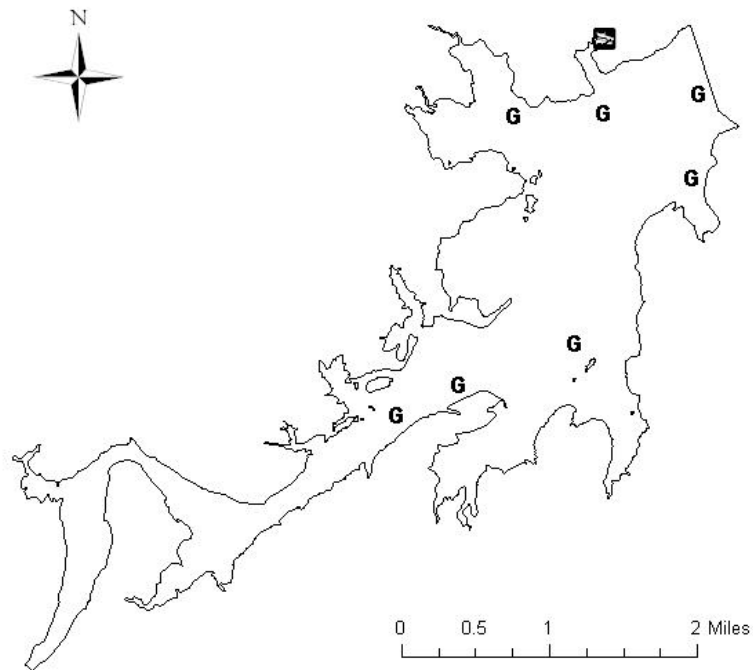
APPENDIX A

Number (N) and catch rate (CPUE) for species collected from gill nets (2013 from Diversion Reservoir, Texas, 2013). Sampling effort was 7 net nights for gill netting. No electrofishing or trap net surveys were completed in 2012 because of low reservoir elevations.

Species	Gill Nets		Trap Nets		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Longnose Gar	3	0.4				
Common Carp	17	2.4				
River Carpsucker	1	0.1				
Smallmouth Buffalo	1	0.1				
Channel Catfish	9	1.3				



Figure 5. Photograph of Diversion boat ramp.

APPENDIX B

Location of sampling sites, Diversion Reservoir, Texas, 2013. Gill net stations are indicated by G.